Using Self-Affirmation to Persuade Male Engineers to Respect Female Engineers

by

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A thesis

presented to the University of Waterloo

in fulfillment of the

thesis requirement for the degree of

Master of Arts

in

Psychology

Waterloo, Ontario, Canada, 2016

Author's Declaration

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Statement of Contributions

This thesis consists of material all of which I, Amrit Kaur Litt, authored, or co-authored.

Co-authors involved in the design and implementation of this research are, Dr. Crystal Tse, Dr. Christine Logel, Dr. Mark Zanna, Dr. Steven Spencer, and Christopher B. Lok.

This thesis was written solely by Amrit Kaur Litt.

Abstract

Women are underrepresented in Science, Math, Engineering and Technology (STEM). Due to negative stereotypes, females in these fields are often treated with less respect from their male peers. In this study, we compared a "Gold-Standard" Contact intervention based on the best-known research-based evidence in prejudice reduction research to a Two-Step Persuasion intervention that affirms male engineers and then persuades them to respect women's abilities in engineering, and compared these interventions to control conditions. This study tests which intervention (a) most effectively increases male engineers' respect for their female peers and (b) can generalize this effect to other women. Both the Gold-Standard Contact and the Two-Step Persuasion intervention increased respect toward female peers with whom male participants had direct interactions. The Two-Step Persuasion intervention also increased respect toward another female engineer with whom they had less direct contact—a female engineering TA—as well as toward a new female they had never met, compared to the contact-based intervention and the control condition. These findings suggest that our Two-Step Persuasion intervention may best generalize male engineers' increased respect toward female peers whom they had direct interactions to other women. These findings suggest that changing men's respect for women can be an effective strategy to create a stereotype-safe social environment. Although future investigation is warranted, the current study is a promising first step in developing this intervention.

Keywords: stereotypes and prejudice, self-affirmation, latent ability, contact theory, STEM

Acknowledgements

I would like to thank my supervisor and mentor, Dr. Steven J. Spencer for your endless support and guidance, for always believing in me and for encouraging me to never give up. I am deeply grateful for your infinite patience and understanding throughout your time as my advisor. I would also like to thank my readers, Dr. Hilary Bergsieker and Dr. Ian McGregor for all their support, understanding, and insightful comments on this project. To my parents: Thank you for always emphasizing the value of a good education and wholeheartedly encouraging its pursuit. You are my rock, my strength, and my inspiration. I would also like to thank my brother, cousins, aunts and uncles for their endless love and support.

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Introduction

Women are underrepresented in Science, Math, Engineering and Technology (STEM). According to a 2011 report from the U.S. Department of Commerce, women hold fewer than 25% of the jobs in STEM, a disproportionally low number of STEM undergraduate degrees, and have a particularly low enrollment in Engineering programs (Department of Commerce, 2011). A report by the Canadian National Household Survey found similar results: Women accounted for only 23% of those who graduated with an Engineering degree (Statistics Canada, 2011).

One cause for the gender gap in STEM may be the negative stereotypes surrounding women and their abilities in math and science. Women, and other minority group members, face extra pressure due to the knowledge that their academic performance may be judged in light of these negative stereotypes. This phenomenon, referred to as *stereotype threat*, leads women to suppress anxiety associated with conforming to the negative stereotypes surrounding their group, as they are aware that others are judging their performance (Steele, 1997). The effort exerted suppressing this anxiety uses up the mental capacity needed to solve difficult test problems (Spencer, Logel, & Davies, 2016), thus undermining women's performance on STEM tests (Spencer, Steele, & Quinn, 1999). Therefore, STEM academic assessments typically underestimate the true intellectual ability of stereotyped women (Walton & Spencer, 2009). In other words, women possess a latent ability that is not accurately captured by assessments in STEM.

Past research has focused on providing women with strategies to cope with stereotype threat so that their performance is a true reflection of their latent ability (Logel, Walton, Spencer, Peach, & Zanna, 2012). Past research, however, has also shown that when female engineering students interacted with a sexist male, they performed worse on an engineering test than women who interacted with a non-sexist male (Logel, Walton, Spencer, Iserman, von Hippel, & Bell, 2009). Although providing women with the skills to cope with stereotype threat is a useful and effective strategy, it does not address the source of the stereotype threat – judgement due to gender stereotypes in the social environment. A more comprehensive solution to reducing stereotype threat is changing the social environment by modifying the attitudes and behaviour of the majority group members, in this case, STEM men.

The current study aims to investigate what type of intervention can most effectively improve the social environment by increasing male engineering students' respect for their female

peers. We developed an intervention based on a Two-Step persuasion technique and compared it to a current "Gold-Standard" intervention that is based on the best-known research-based evidence to reduce prejudice between members of different groups.

Two-step models of persuasion (c.f., Correll, Spencer, & Zanna, 2004) seek to create a psychological state that is targeted by the persuasive appeal. In the current intervention, we sought to self-affirm participants to create an open mindedness to challenging arguments (Sherman & Cohen, 2006). We then educated male engineering students on the research findings on the latent ability of their female peers with the goal of teaching them that their female peers are more competent and proficient in engineering than they have recognized. However, an implication of latent ability research in the academic environment is that when a male and female engineering student receive a similar grade, the female student may be operating under stereotype threat, thus she may actually possess greater abilities than her male peer. Because learning that female counterparts who are matched to them in achievement may actually possess greater competence in the field is threatening to male engineering students, by self-affirming participants before the message we sought to create a psychological state that would ameliorate this threat. After this persuasive appeal, male participants were also given the opportunity to work with a female engineering student so they can directly witness their peer's latent ability and put their new-found beliefs in their female peers into practice by demonstrating respect behaviours.

The "Gold-Standard" intervention used in this study is based on Gordon Allport's Contact Theory. Allport argued prejudice is rooted in ignorance, and once people experience direct contact with an outgroup member, they will learn that stereotypes are inaccurate generalizations of the outgroup (Allport, 1954). Allport's contact theory outlines four optimal contact conditions for decreasing prejudice and improving intergroup relationships: equal status within the situation, common goals, intergroup cooperation, and authority support (Allport, 1954). To facilitate intergroup contact in our study, participants were asked to participate in intergroup activities. These activities served as an opportunity for participants to engage in direct contact with outgroup members under Allport's optimal conditions, as well as a way to improve the external validity of the study as engineering students must often work in groups to complete assignments in their classes.

This Gold-Standard Contact intervention also incorporated elements of another well-known technique to improve intergroup interactions: The Jigsaw Classroom. A jigsaw classroom is an alternative teaching technique based on cooperation and interdependence. This technique supports Allport's four conditions of optimal intergroup contact as students have equal group status in the situation, common goals, intergroup cooperation, and authority support. Students must cooperate with their peers in order to achieve a goal (Aronson, 2002). Students work in small groups with each child given a part of the topic to be studied (Aronson, 1978). Students must then teach their peers what he or she learned (Aronson, 1978). Similar to a jigsaw puzzle, each student's contribution is like a jigsaw piece and is essential for the production and full understanding of the final product (Aronson, 2002). Each student must fit their pieces of the subject together to form a complete "jigsaw" picture (Aronson, 1978). The jigsaw classroom technique was included in this condition because past research has shown that this technique can reduce racial prejudice, improve academic performance, and increase the liking of peers (Walker & Crogan, 1998).

Past research has also outlined another strategy to help improve intergroup interactions: Intergroup social connections. In this context, a social connection refers to sharing interests with another person, even minimal or arbitrary similarities (e.g. birthday, books, hobbies) (Walton, Cohen, Cwir & Spencer, 2012). Research on social connections has shown that when participants experience a social connection with another person, they can adopt the goals as well as the emotional and physiological states of their partner (Walton et. al, 2012; Cwir, Carr, Walton & Spencer, 2011). Thus, through a social connection, one can incorporate another person into important aspects of the self. It is hypothesized that if outgroup members form a social connection, they will incorporate the other into one's identity, thus leading to a more positive view of an outgroup member.

Lastly, another well-known strategy to teach others to reduce prejudice and discrimination is modelling appropriate behaviour. According to Social Learning Theory, learning can take place through observation of a model (Bandura, 1977). In a university environment, we posit that a male engineering teaching assistant (TA) would be an appropriate and meaningful role model to a male engineering undergraduate student. Therefore, to help teach male engineering students how to act respectfully toward a female engineering student, we

instructed male TAs to model respect behaviours toward a female engineering TA throughout the lab sessions.

We hypothesized that the two interventions, Two-Step Persuasion and Gold-Standard Contact, would lead to increased levels of respect toward the female engineering group member with whom male participants shared direct interactions, compared to the Persuasion Control and Contact Control conditions. A critical element of changing the social environment for female engineering students is the generalizability of the intervention effects. If male students only develop respect for female students they have direct contact with, the overall environment cannot change. To create a stereotype-safe environment where negative stereotypes no longer exist, men must generalize the respectful attitudes they have towards the women they have contact with to other women in the field and to women in general. Past contact research has examined the generalizability of the effect, and found that the positive outcomes from direct contact with an outgroup member can generalize to other members of that group (Pettigrew & Tropp, 2006), but this process can and often does fall short. We hypothesized that the males in the Gold-Standard Contact intervention would not generalize to other females the positive and respect-related attitudes they felt about the female group member with whom they shared direct interactions. Feeling respect for one specific woman may facilitate focusing on this one target but not on considering whether she is representative of women in general. Therefore, the connection they form with a female peer may not extend to other females in general. In contrast, we hypothesize that the Two-Step Persuasion intervention would lead males to generalize the respect they felt toward their female group member to other females with whom they did not share direct experiences. This is because the increase in respect these males have toward their female peer is not based on direct contact with a specific person with whom they share specific similarities, but on learning new general information that should apply to women in general, not just to the woman with whom they have direct contact.

Therefore, we expect both the Two-Step Persuasion condition and the Gold-Standard Contact condition to increase respect over the control condition for the woman they interact with in their groups. However, only the Two-Step Persuasion condition will lead to more respect for other women than seen in the Contact condition and control groups.

Method

Participants and Design

Participants recruited for this study were first-year engineering undergraduate students. Eligible participants were enrolled in an engineering major—Software, Computer, Electrical, or Mechatronics engineering—where female students accounted for less than 10% of the classroom population. A total of 244 engineering students participated in this study during either Fall 2013 or Fall 2014 (2013: 72 males, 27 females; 2014: 110 males, 35 females). Each cohort was required to participate in this study over the course of an entire 4-month semester. Participants who did not complete the premeasure, attend any group-work sessions, or complete the dependent measures were dropped from analyses, yielding a final sample of 205 participants (2013: 63 males, 23 females; 2014: 90 males, 29 females).

This study had four conditions (Two-Step Persuasion, Gold-Standard Contact, a control condition for the Two-Step Persuasion, and a control condition for the Gold-Standard Contact) aimed at testing which intervention best leads to increases in male engineering students' respect toward female engineers as well as other females in general (see Table 1). The intervention of greatest interest in this study is the Two-Step Persuasion condition. In this intervention, participants are exposed to a Two-Step persuasion that includes undergoing a self-affirmation followed by learning about the latent ability of fellow female engineering students. This intervention also involved participating in intergroup activities as well as watching a male TA model respect behaviours toward a female TA. To control for whether the persuasive message alone is sufficient to produce increases in male students' respect toward female engineers, a Persuasive Control condition was developed which exposes participants to a control self-affirmation and then teaches them about latent ability, without any intergroup activities or behaviour modelling as this condition had two male TAs.

The Gold-Standard Contact condition was developed and comprised of best-practice, evidence-based prejudice reduction intervention techniques. We are investigating whether the Two-Step Persuasion Intervention can increase males' respect for females beyond what the Gold-Standard Contact Intervention is capable of producing. This condition integrated Allport's Contact Theory with improving social connections through mere belonging (Cwir et al., 2011), and a jigsaw experience (Aronson et al., 1978). This condition controlled for whether intergroup

activities completed in a jigsaw format with group members who are socially connected through shared interests, combined with a male TA modelling respect toward a female TA, but *without* the persuasive message, is sufficient to increase male engineers' respect for females. To control for whether basic group contact alone is sufficient to produce increases in males' respect for female engineering students, we developed the Contact Control condition. In this condition, subjects participated in intergroup activities without intergroup social connections, jigsaw classroom techniques, or a persuasive message. Participants in this condition also did not observe respect behaviour modelling because they had two male TAs.

Table 1: Overview of Study Conditions

Task	Two-Step Persuasion (n = 51)	Persuasion Control (n = 51)	Gold Standard Contact (n = 49)	Contact Control (n = 54)
Self-Affirmation	✓			
Control self-affirmation		✓		
Learn about latent ability	✓	✓		
1 male TA models respect to 1 female TA	✓		✓	
2 male TAs		✓		✓
Intergroup Activities	✓		✓	✓
Intergroup Social Connection			✓	
Yoked Intergroup Social Connection				✓
Jigsaw classroom technique			✓	
Sessions Attended	1, 2, 3, 4	1, 4	1, 2, 3, 4	1, 2, 3, 4

Materials

Pre-measures:

All participants completed the following measures: Successful transition to Engineering program questionnaire; List 5 friends, classmates and study partners; Future of Engineering at UW; and Background information. Many items in these questionnaires measured participants' attitudes and feelings toward females in engineering, other items were used to bolster the cover story and hide the true purpose of the study. Participants in the Gold-Standard Contact condition

and Contact Control condition also completed a General Interests Survey (GIS). Please see Appendix A for full details.

Manipulations:

Affirmation Task. The Two-Step persuasion involved completing a self-affirmation task and learning about ability. To self-affirm participants, they completed a values affirmation task that asked them to rank values from 1 to 7 (1 = *most important,* 7 = *least important*), and to write about the top-ranked value. The control affirmation asked participants to write about why someone else might think the value they ranked as 6 was an important value (see Appendix B for full details).

Latent Ability Instruction. To teach participants about latent ability, participants first completed a written exercise about latent ability, and then learned about latent ability research by watching a video. Participants in the Two-Step Persuasion condition completed refresher affirmation and latent ability tasks to ensure participants remembered what they learned about latent ability (see Appendix B for full details).

Respect Modelling. Male TAs modelled respect behaviours toward the female TA throughout the presentations at the beginning of each session (see Appendix B for full details).

Intergroup activities. Participants were asked to complete building tasks in a group. Groups were instructed to work together to build the tallest tower and the strongest bridge with materials provided by the TAs.

Intergroup Social Connection. A social connection between participants was established through shared interests. Male participants in the contact condition viewed a profile of their female group member, which highlighted that they shared 2 meaningful interests. Male participants in the contact control condition viewed a yoked profile, such that the interests listed in the profile belonged to another female in the study, thus ensuring the male participants did not share any interests with the female participants.

Jigsaw classroom. A jigsaw classroom technique was implemented through the use of the building materials. Each building material was viewed as a "piece of the jigsaw puzzle," as each item was critical to the success of building a tower and a bridge. Each participant was assigned to a single building material and could touch only that material during the building task. Therefore, every group member had to work together and members had to rely on each other to

achieve the goal of building the strongest bridge. To ensure the female member was viewed as a critical and competent member of the group, TAs conducted a rigged draw that allowed group members to receive more building materials if the female group member correctly answered a skill-testing question (see Appendix B for details).

Dependent Measures

Group member evaluation. To measure participant attitudes and feelings toward those they had direct interactions with, participants were asked to evaluate their group members. Participants responded to 7 items using a Likert scale (0 = *not at all*, 10 = *very much*): "How well do you remember this person?", "How nice was this member of your group?", "How much did you like this member of your group?", "How intelligent was this member of your group?", "How much did you respect this member of your group's contribution to the group?", "If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together?", and "If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?"

TA evaluation. To measure participant attitudes toward another female whom they saw regularly but interacted with minimally, participants were asked to evaluate each of their TAs. Participants indicated their agreement *(*0 = *strongly disagree,* 10 = *strongly agree)* to the following 5 statements: "The TA was a warm person", "I liked the TA", "The TA was competent at his/her job", "I respected the TA", and "I would like to have the TA as a course mentor for my 4th year project". Participants were also asked to indicate which TA they would rather have as a course mentor for their 4th year project.

Behavioural coding. To measure participant behaviour toward a new female they had not met before, female research assistants (RAs) interacted with male participants and coded their behaviour on a number of different aspects. Using a scale from 0 (*not at all*) to 5 (*very*), RAs rated participants on the following items: "How confident did he seem?", "How dominant did he seem?", "Did he flirt with you?", "How sexist was he?", "How warm was he?", "How much did you like him?", "How respectful was he?", "Was he paying attention?", "Was he taking you seriously?", "Did he patronize you?", and "How much eye contact did he make with you?" RAs also rated participants (1 = *never,* 5 = *very often*) on how often they looked at her body and how often they interrupted her. RAs also rated the openness of the participant's posture

(1 = *very closed*, 4 = *very open*) and degree of physical contact (1 = *none*, 4 = *a lot*). Last, RAs were also asked to provide close-ended responses to indicate whether the participants sat in the chair situated closer or further away from the RA, and whether participants checked their phones during the interaction.

Other measures. Participants completed a number of other measures: List 5 friends, classmates and study partners; Modified Benevolent Sexism Inventory; Implicit Association Test (IAT), and Response to a Sexist Joke. Female participants were also asked to evaluate their male group members (see Appendix C for full details). These additional measures will not be discussed in this thesis.

Procedure

First-year engineering students were recruited from engineering classrooms to participate in a psychology study ostensibly aimed at testing and evaluating a program called the Successful Transition to Engineering Program (STEP). Participants were told STEP was aimed at helping first-year engineering students develop professional engineering skills. Participants were also told that STEP was serving as a research project to investigate if the program can shape students' attitudes and beliefs in a way beyond workplace skills. During the 2014 cohort of this study, a tutorial on wardrobe in the workplace was added to help improve the cover story.

All participants were told the study would last four months, and would involve attending sessions in a lab. In the first session, all participants completed the same set of pre-measures to collect background and baseline information (see Appendix A). The final session was identical across conditions: Participants met with an unfamiliar female RA, ostensibly to talk about the overarching messages of the STEP program. However, the RA actually coded participants' behaviour for respect toward a new female. Finally, all participants completed an electronic questionnaire, were interviewed to assess suspicion levels, and were fully debriefed.

Two-Step Persuasion. For the target Two-Step Persuasion intervention, participants attended 4 in-lab sessions. During the first session, participants watched a presentation by an actual male and female engineering TA. The presentation gave participants an introduction to the STEP program. The presentation also served as an opportunity for the male TA to model respect toward the female TA by asking her for help on a research project by stating, *"Do you think you'd have some time to help me with it? I think I could really benefit from your help since you*

have so much knowledge on the topic." After completing the pre-measures, participants were asked to complete some filler items, indicate their thoughts and feelings about female engineering students, and complete a values affirmation task where participants were asked to rank and write about their most important value. Next, participants completed a written exercise designed to help students think about a time in their lives when they might have witnessed latent ability in others. The purpose of this task was based on the guided-learning model, which tries to get students to discover the solution themselves instead of being told the answer by a teacher. We hypothesized, that a guided-learning technique would further lower defensiveness by leading students to believe they were already aware that latent ability exists. Last, participants watched a video which showed a credible source, in this case a Social Psychology professor, explain latent ability using a metaphor of a runner wearing leg weights (see Appendix B for a script of the video).

During the second session, participants once again watched a presentation by the male and female TA. The presentation was used as an opportunity for the male TA to subtly model respect toward the female TA by having him introduce her and state, *"She is awesome, she is helping me with my project and I appreciate her expertise."*

Due to a 3-and-a-half-week gap between the first and second session, participants were given a latent ability refresher. Participants completed a values affirmation task again, and then were asked to write about the runner analogy from the video in session 1, followed by their male TA reviewing the information they learned about latent ability from the previous session. Next, participants were randomly assigned to groups of 2-5 participants, with 1 female in each group. The ratio of male to females in each group was designed to parallel the ratio of male to female engineering students in a classroom. Participants were asked to complete a building task where their goal was to build the tallest structure they could with their teams. It was presented as an opportunity to develop team work skills and was not presented as a competitive activity. (The 2014 session included a tutorial about appropriate workplace attire to bolster the cover story.)

During the third session, participants watched a presentation by the male and female TA. To bolster the cover story, the female TA discussed tips for public speaking. The male TA used the presentation to again subtly model respect toward the female TA by telling students they were going to *"learn from an accomplished public speaker"*. The participants completed another affirmation refresher task where they were asked to write about a self-identified

important identity that they have (i.e., musician, gamer etc.) and were also asked to write about the most recent thing they did as part of that identity. Next, the male TA spoke about the video recall task from session 2. He told participants that many people could not recall the take-home message of the video and gave a summary of the concept to the participants again. Next, to bolster the cover story, the male TA read aloud the testimonials of other first year male engineer students and how they used to feel like they might not belong or not succeed in engineering. The male TA then stated that he did not really have any such experiences, and then asked the female TA whether she had any experiences. The female TA spoke about true personal experiences of herself and of the other female TA of feeling lack of fit and the discrimination faced as a female in engineering (see Appendix B for details). The male TA again models respect in his response by saying, *"Thank you. That was interesting. I didn't know you went through experiences like that as you've been so successful in your field"*. Last, participants completed a second team building task where they were asked to build the strongest bridge in the same groups from the previous session.

Persuasion Control. For the Persuasion Control condition, participants attended 2 in-lab sessions. During the first session, participants watched a presentation by two actual male engineering TAs. The presentation gave participants an introduction to the STEP program. In contrast to the target intervention, the male TA did not model respect behaviours toward a female engineering TA because both TAs were male. After completing the pre-measures, participants were asked to complete a control values affirmation task where participants were asked to rank and write about their second-lowest-ranked value and why it would be important to someone else. Next, similar to the target intervention condition, participants completed a written exercise designed to help students think about a time in their lives when they might have witnessed latent ability in others. Last, participants watched the same video explaining latent ability from the Two-Step Persuasion condition. Participants in the Persuasion Control condition did not return to the lab until the last session.

Gold-Standard Contact. For the Gold-Standard Contact condition, participants attended 4 in-lab sessions. During the first session, as in the Two-Step Persuasion target intervention, participants in the Gold-Standard Contact condition watched a presentation by an actual male and female engineering TA which gave participants an introduction to the STEP program. Similar to the Two-Step Persuasion intervention, the male TA modelled respect toward the

female TA during the presentation by asking the female TA for help on research project by stating, *"Do you think you'd have some time to help me with it? I think I could really benefit from your help since you have so much knowledge on the topic."* After completing the pre-measures, participants were told they would be put in groups for the upcoming sessions, and that each participant would receive a profile about their group members. To create the profile, each participants was asked to take a photograph, and to fill out a General Interests Survey (GIS) indicating likes and interests.

During the second session, participants once again watched a presentation by the male and female TA. The presentation was again used as an opportunity for the male TA to subtly model respect toward the female TA by having the male TA introduce the female TA and state, *"She is awesome, she is helping me with my project and I appreciate her expertise."* The 2014 session also included the tutorial about appropriate workplace attire to bolster the cover story.

In this condition, participants were randomly assigned to groups of 2-5 participants, with 1 female in each group. The ratio of male to females in each group was designed to parallel the ratio of male to female engineering students in a classroom. Participants learned about their group members by viewing their profile. To foster a sense of connection between each male group member and the sole female group member, the content of the profiles was carefully selected such that each male member had two interests in common with the female member. These interests (e.g., favourite movies, books, TV shows, foods, vacation spots, etc.) were taken from the GIS in the first session. To increase the likelihood that a random male participant would share interests with a random female participant, males were asked to list 3 items under each interest category, whereas female participants were asked to list 6 items for each interest. To create the profiles and groups, a random female participant was selected along with a random male participant. Their lists of interests were compared and, if possible, two common interests were highlighted. Next, another random male participant was selected and the process of looking for two common interests was repeated. If two common interests could not be found, that male participant was removed from the group and another male participant was selected. If more than two common interests were found, only two were chosen to be displayed on the final profiles. Once a group had at least three male members, that group was considered complete and the rest of the interests were filled in with items that did not match between the female and male members. The final profiles were comprised of 20 interests made up of 10 different interest

categories (e.g., favourite TV shows, favourite foods, etc.) with two items under each category (see Appendix B for a sample profile).

After reviewing their group members' profiles and learning they share interests with the female group member, participants were asked to complete a building task where their goal was to build the tallest structure they could with their teams. Participants in this condition were instructed to build their structure using a "jigsaw classroom" technique, such that only one participant could touch a single material. The female group member received a crucial material to ensure her role would be central to the success of the group[1].

During the third session, participants watched a presentation by the male and female TA. To bolster the cover story, the female TA discussed tips for public speaking. As in the Two-Step Persuasion condition, the male TA used the presentation to again subtly model respect toward the female TA by telling students they were going to *"learn from an accomplished public speaker."* Next, students were given an opportunity to briefly review their group members' profiles before beginning their team task. Groups were instructed to build the strongest structure they could. Similar to the previous session, participants in this condition used the "jigsaw classroom" technique during this building task. To further emphasize the criticalness and competency of the female group member, TAs ostensibly did a random draw with each group to answer a skill-testing question that could earn them extra building materials. In reality, the draw was rigged so the female group member was always selected to answer the skill-testing question. The skill-testing physics question was designed to highlight her engineering-related competence and to not be too difficult. All females answered correctly.

Contact Control. In the Contact Control condition, participants attended 4 in-lab sessions. During the first session, similar to participants in the Two-Step Persuasion Control condition, participants watched a presentation by 2 real male engineering TAs which gave participants an introduction to the STEP program. Male TAs in this condition did not model any respect behaviours during this session. After completing the pre-measures, participants in this condition were told they would be put in groups for the upcoming sessions, and that each participant would receive a profile about their group members. As such, each participant was

[1]After the first session, one of the female participants assigned to a group could no longer participate in the study. A confederate was hired to pretend to be that participant for session 2 and session 3 to allow the male participants in the group to continue with their participation in the study.)

asked to take a photograph, and to fill out a General Interests Survey (GIS) to indicate their likes and interests.

During the second session, participants once again watched a presentation by two male TAs. The 2014 cohort received a tutorial about appropriate workplace attire to bolster the cover story. In this condition, participants were randomly assigned to groups of 2-5 participants, with one female in each group. The ratio of males to females in each group was designed to parallel the ratio of male to female engineering students in a classroom. Participants learned about their group members by viewing their profile. Male participants in this condition did not share any interests with their female group member. To ensure there were no similarities, profiles were yoked such that male participants viewed the profile of a different female in the study. Because male profiles did not need to match female profiles, all participants in this condition were asked to list only 3 items for each preference on the GIS. After reviewing their group members' profile, participants were asked to complete a building task where their goal was to build the tallest structure they could with their teams. Participants in this condition were not instructed to build their structure using a "jigsaw classroom" technique.

During the third session, participants were given a tutorial on public speaking by two male TAs. Next, students were given an opportunity to briefly review their group members' profiles before beginning their group task. Participants were instructed to build the strongest structure they could. Similar to the previous session, participants in this condition did not use the "jigsaw classroom" technique during this building task. There was no rigged draw and no skill-testing question in this condition.

Results

For our analyses, we focused on three dependent measures: group member evaluation, TA evaluation, and behavioural coding. We were interested in the male participants' respect-related attitudes and behaviour toward the female engineering student in their group, a different female whom they saw regularly but with whom they did not have much direct contact (their TA from the sessions), and a new female who they had not met before. Thus, we aimed to test the effectiveness and the generalizability of the different interventions.

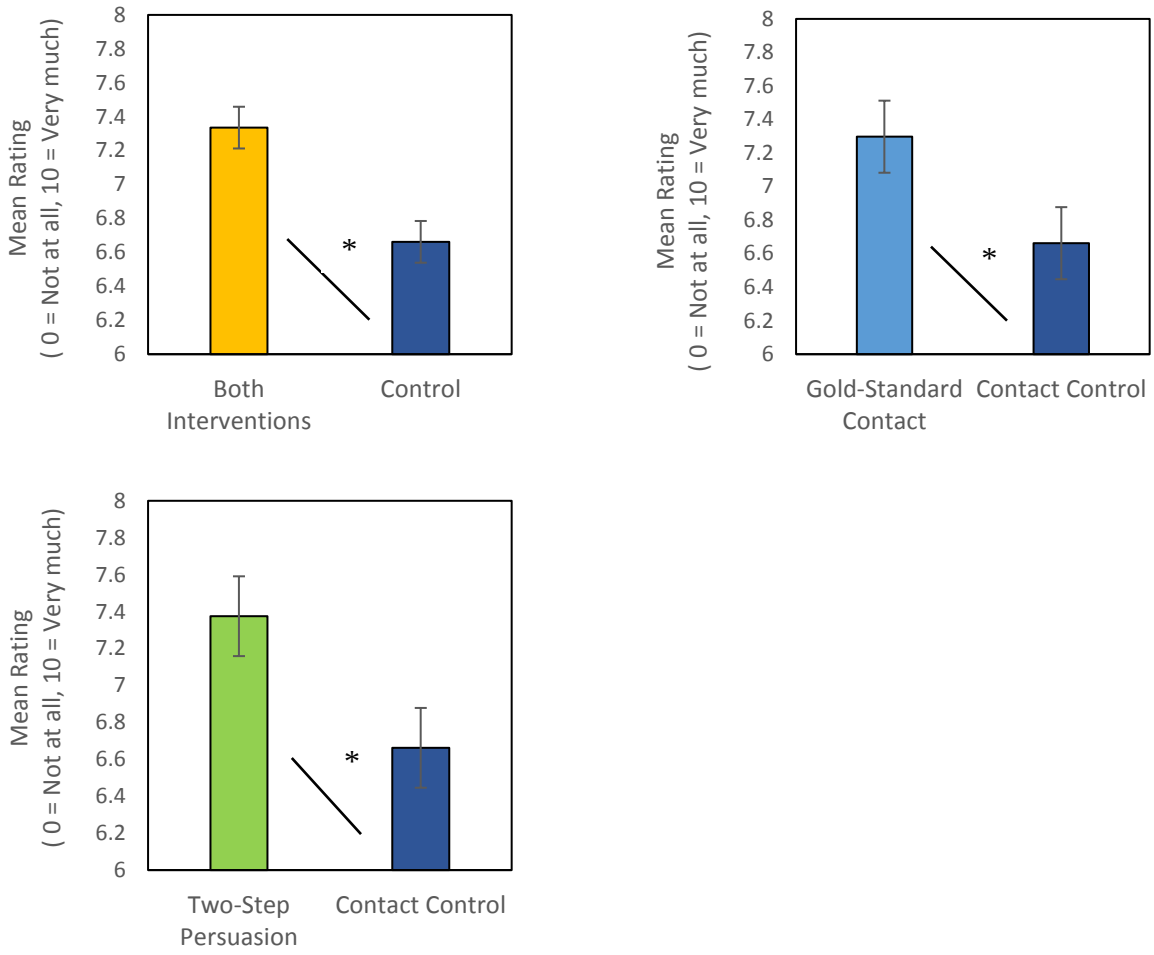
We hypothesized that the Two-Step Persuasion and the Gold-Standard Contact interventions would both lead male engineers to increase their levels of respect for female engineering group members, compared with the control condition. However, we also predicted that the Two-Step Persuasion intervention would generalize to other females, such that male participants would report an increase in respect toward their female TA, and to a new female who they had not met, whereas the Contact, Contact Control, and Persuasion Control conditions would not.

Group member evaluation. To measure participant attitudes and feelings toward those with whom they interacted directly, male participants were asked to evaluate their female group members. Participants in the Persuasion Control condition were not included in this analysis because they did not participate in group activities so they did not have any group members. An engineering competency composite was created by combining the 2 items, "*If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together*?", and "*If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?*" ($\alpha = .93$).

A regression controlling for how much the male participants liked the female group member and how nice they thought she was ($\alpha = .83$) revealed an effect of condition, such that male participants in both intervention conditions rated their female group member as significantly more competent in engineering ($M = 7.34$, $SD = 2.49$) than the Contact Control condition ($M = 6.66$, $SD = 2.64$), $t(107) = 2.578$, $p = .01$. The Persuasion Control condition was not included in this analysis because participants did not complete activities in groups. After analyzing each intervention individually, results indicated male participants in the Gold-Standard Contact condition rated their female group member as more competent in engineering ($M = 7.30$,

SD = 2.75) than the control condition, $t(107) = 2.169$, $p = .03$, and male participants in the Two-Step Persuasion condition also rated their female group member as more competent in engineering ($M = 7.38$, $SD = 2.23$) than the control condition, $t(107) = 2.266$, $p = .03$[2]. Therefore, both the Two-Step Persuasion and the Gold-Standard Contact interventions led males to increase their level of respect toward the female group member they had direct interactions with, compared with the control condition (see Figure 1).

Figure 1: Males' Rating of Female Group Members' Competence in Engineering by Condition



Note: Error bars represent standard error for each condition.

[2] Male participants also rated female group members on how intelligent they thought she was and how much they respected her. When controlling for these two items as a single composite, in addition to the liking and niceness composite, the regression results obtained similar results when comparing the two interventions with the Contact Control condition, $t(106) = 2.301$, $p = .02$, and when comparing the Two-Step Persuasion with the Contact Control condition, $t(106) = 2.515$, $p = .01$. However, results were not significant when comparing Gold-Standard Contact with the Contact Control condition, $t(106) = 1.462$, $p = .15$.

TA evaluation. To measure participant attitudes toward another female who they saw regularly but whom they did not have many direct interactions, participants were asked to evaluate their TAs.

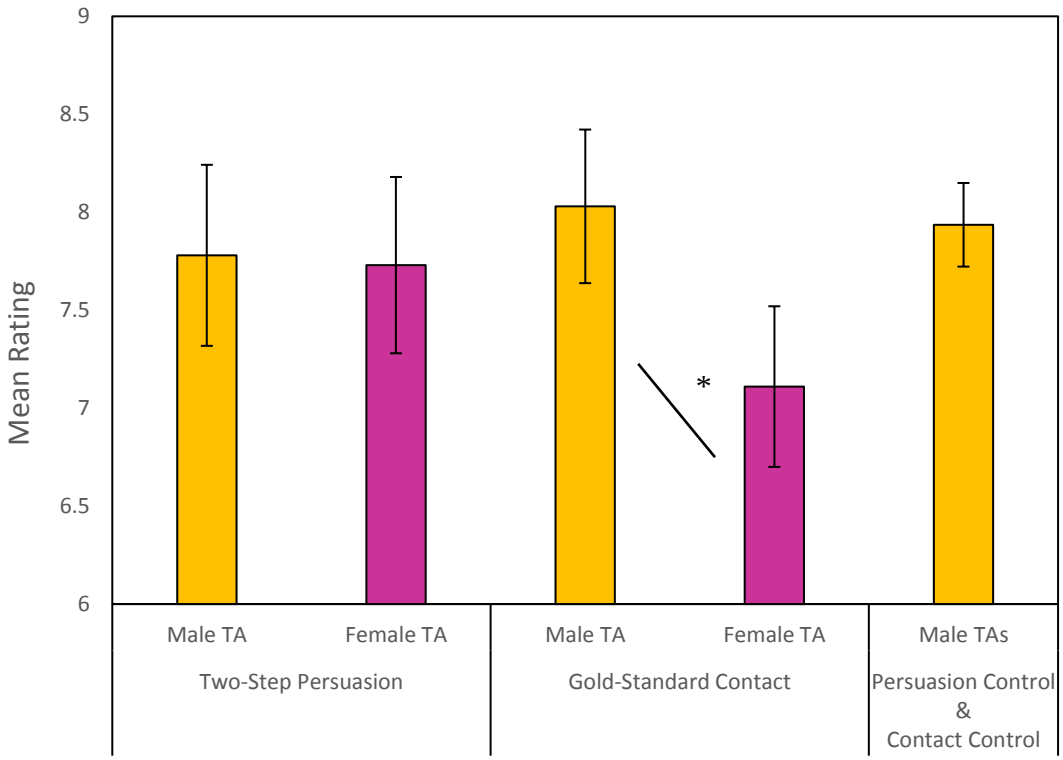
During their last year in university, engineering students are expected to complete a final project under the supervision of a TA. This project is an important aspect to an engineering student's degree as some students actually develop and sell their idea after they graduate. Therefore, students would typically want to select a supervisor who they believe is competent in the field and whose knowledge they respect. As such, participants were asked to indicate their agreement *(*0 = *strongly disagree,* 10 = *strongly agree)* to the following statement for *each* TA: "I would like to have the TA as a course mentor for my 4th year project".

A mixed-model analysis, with condition as a between-subjects variable and TA as a within-subjects variable, revealed a significant condition by TA interaction regarding which TA male participants preferred to have as a course mentor, $F(3, 146) = 2.834$, $p = .04$. Subsequent analyses revealed a significant difference between the preference for a male TA over a female TA for males in the Gold-Standard Contact condition, $F(1, 36) = 8.736$, $p = .01$, with males preferring the male TA ($M = 8.03$, $SE = .392$) more than the female TA ($M = 7.11$, $SE = .41$) This is shown in the middle two bars of Figure 2. In the Two-Step Persuasion condition, participants rated the male TA and the female TA very similarly (Male TA: $M = 7.78$, $SE = .462$; Female TA: $M = 7.73$, $SE = .45$). As seen in the two bars on the far left of Figure 2, there was no significant difference between which TA Two-Step Persuasion males preferred to have as a course mentor, $F(1, 36) = .019$, $p = .89$. Males in the Persuasion Control and Contact Control conditions had two male TAs. Not surprisingly, the two male TAs were not rated differently in either of the control conditions, (Persuasion Control: $F(1, 37) = .504$, $p = .48$; Contact Control: $F(1, 37) = 1.457$, $p = .24$). As such, the means were collapsed across condition and TA to produce a single score (see the right-most bar on the far right in Figure 2).

Therefore, males in the Gold-Standard Contact condition preferred to have their male TA as a course mentor compared to their female TA, whereas males in the Two-Step Persuasion condition evaluated both TAs equally. These results suggest the Two-Step Persuasion intervention led males to generalize the increased respect they felt toward their female group member with whom they shared direct experiences with, to another female who they saw regularly but whom they did not have many direct interactions. In contrast, the Gold-Standard

Contact intervention did not lead males to generalize their positive attitudes from the female that they had direct contact with to another female who they saw regularly but whom they did not have many direct interactions.

Figure 2: Male participants' TA Mentor Preferences for 4th Year Project by Condition



Note: Error bars represent standard error for each TA in each condition.

Behavioural coding. To measure participant behaviour toward a new female they had not met before, female RAs interacted with male participants and coded their behaviour on a number of different aspects. A factor loading was conducted using a Varimax rotation. Three factor loadings emerged that we labelled as Liking, Ignoring, and Sexual Interest. The Liking factor consisted of the following items: "*How much do you like him?*", "*How warm was he?*", "*How respectful was he?*", "*Was he taking you seriously?*", and "*How sexist was he?*" (reverse coded). Higher scores on this factor indicated more positive RA impressions of the male participant. The Ignoring factor consisted of the following items: "*Was he taking you seriously?*", "*How often did he interrupt you?*" (reverse coded), "*Did he patronize you?*" (reverse coded), and "*Was he paying attention?*". Higher scores on this factor indicated more

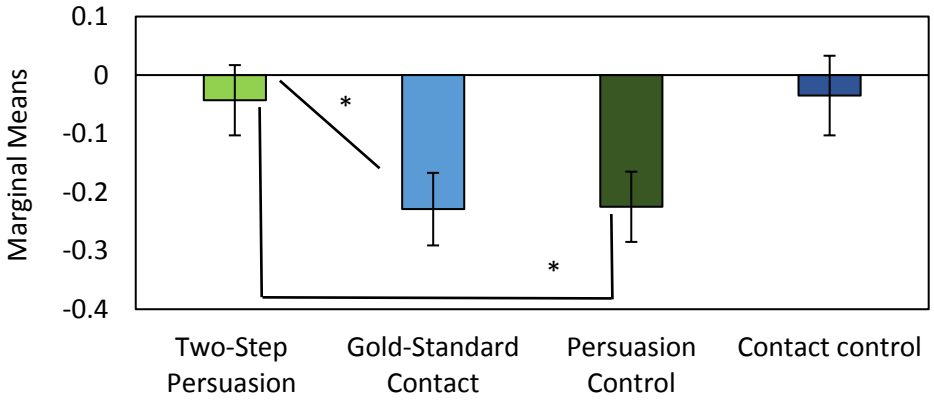
attention and interest in what the RA was saying. The Sexual Interest factor consisted of the following items: "*How sexist was he?*", "*Did he flirt with you?*", "*How dominant did he seem?*", and "*How often did he look at your body?*". Higher scores on this factor indicated more sexual interest in and dominant behaviour toward the RA. All items had a minimum loading of .47. The Eigenvalues indicated the Liking factor explained 40.73% of the variance, the Ignoring factor 20.74% of the variance, and the Sexual Interest factor 12.27% of the variance.

Subsequent analyses were conducted with the factor scores from the factors above. An ANCOVA was conducted investigating the effect of condition on the Ignoring factor, while controlling for the Liking factor and specific coder. Across the 2 waves of data collection, we used 9 different coders to analyze participant behaviour. Therefore, we controlled for coders as a random factor in the design in order to account for any individual differences between each coder that might bias the results. We controlled for the Liking factor in this analysis because from a coder's perspective, feelings of attention can occur because one is liked by their interaction partner or because one is respected by their interaction partner. When someone feels liked or feels respected, they are less likely to feel ignored. Therefore, from the coder's perspective, it can be difficult to distinguish between being liked and being respected. However, we were interested in the attention the RA receives that derives from being respected, but not from being liked. Therefore, we controlled for whether the RA felt liked by male participants.

Results revealed a trending effect of condition on RA ratings of whether male participants were paying attention and seemed interested in what the RA was saying, $F(3, 125) = 2.233$, $p = .09$. However, post-hoc comparisons between the males in the Two-Step Persuasion condition versus the Gold-Standard Contact condition revealed a significant effect of condition, $F(1,125) = 3.971$, $p = .05$, such that the female RAs rated the males in the Two-Step Persuasion condition as more likely to pay attention and demonstrate interest when the RA was speaking (*Marginal mean* = -.05, *SE* = .05) than the Gold-Standard Contact males *(Marginal mean* = -.21, *SE* = .05). Additional comparisons between the males in the Two-Step Persuasion condition versus the Persuasion Control condition revealed a significant effect of condition, $F(1, 125) = 5.039$, $p = .03$, such that Two-Step Persuasion males displayed more interest and attention when the RA was speaking (*Marginal mean* = -.09, *SE* = .06) than Persuasion Control males (*Marginal mean* = -.27, *SE* = .06). Analysis comparing males in the Two-Step Persuasion condition to the

Contact Control males was conducted. Results revealed no effect of condition, $F(1, 125) < 1$[3]. Therefore, according to female RAs, when interacting with males from the Two-Step Persuasion condition, these males seemed to display more respect-related behaviours toward them by paying more attention and showing an interest when the RA was speaking, compared to males in the Gold-Standard Contact intervention and the Persuasion Control condition (see Figure 3). These results suggest males in the Two-Step Persuasion intervention generalize the positive and respect-related attitudes toward the female whom they shared direct interactions with to a new female they had not met before; whereas males in the Gold-Standard Contact intervention do not.

Figure 3: RA Ratings of Male Participants' Attention and Interest Behaviours Toward Them by Condition



Note: Error bars represent standard error for each condition.

[3] Additional ANCOVAs were conducted that investigated the effect of condition on each factor loading individually (i.e. Ignoring, Liking, and Sexual Interest), without controlling for the Liking Factor. For the Ignoring factor, there were no effects of condition on RA ratings of males' interest and attention behaviours when the RA was speaking when analyzing all 4 conditions, $F(3, 126) = 1.174$, $p = .32$; when comparing the Two-Step Persuasion to the Gold-Standard Contact condition, $F(1, 126) = 1.713$, $p = .19$; when comparing the Two-Step Persuasion to the Persuasion control condition, $F(1, 126) = 2.623$, $p = .11$; and when comparing the Two-Step Persuasion to the Contact Control condition, $F(1, 126) = .041$, $p = .84$. For the Sexual Interest Factor, there were no effects of condition on RA ratings of males' sexual interest and dominant behaviour toward the RA when analyzing all 4 conditions, $F(3, 126) = 1.09$, $p = .356$; when comparing the Two-Step Persuasion to the Gold-Standard Contact condition, (Two-Step Persuasion: $M = -.234$, $SE = .172$; Gold-Standard Contact: $M = .137$, $SE = .174$); when comparing the Two-Step Persuasion to the Persuasion Control condition, (Two-Step Persuasion: $M = -.222$, $SE = .186$; Persuasion Control: $M = .047$, $SE = .183$); and when comparing the Two-Step Persuasion to the Contact Control condition, (Two-Step Persuasion: $M = -.171$, $SE = .204$; Contact Control: $M = -.165$, $SE = .215$). For the Liking Factor, there were no effects of condition on RA ratings of greater positive feelings toward the male participants when analyzing all 4 conditions, $F(3, 126) < 1$; when comparing the Two-Step Persuasion to the Gold-Standard Contact condition, (Two-Step Persuasion: $M = -.076$, $SE = .179$; Gold-Standard Contact: $M = .328$, $SE = .182$); when comparing the Two-Step Persuasion to the Persuasion Control condition, (Two-Step Persuasion: $M = -.009$, $SE = .157$; Persuasion Control: $M = .144$, $SE = .154$); and when comparing the Two-Step Persuasion to the Contact Control conditions, (Two-Step Persuasion: $M = -.127$, $SE = .177$; Contact Control: $M = .045$, $SE = .187$).

Discussion

This study was aimed at investigating which type of intervention best leads male engineering students to increase their respect toward female engineering students they have direct contact with, toward females who they saw regularly but did not have much contact with, and toward a female they had not seen before. This generalization is a critical component of the interventions as changes to the social environment are only possible if males can generalize from a positive experience with a woman to the better treatment of women in general. Results from this study indicated both the Two-Step Persuasion intervention and the Gold-Standard Contact intervention led males to increase their level of respect toward the female group member they had direct interactions with, compared to control participants (see Figure 1). Males in the Gold-Standard Contact condition preferred to have their male TA as a course mentor compared to their female TA, whereas males in the Two-Step Persuasion condition preferred both TAs equally (see Figure 2). These results suggest males in the Two-Step Persuasion intervention are extending their increased levels of respect to other females in the field, whereas males in the Gold-Standard Contact condition are not. Last, according to female RAs, males from the Two-Step Persuasion condition displayed more respect-related behaviours toward them by paying more attention and showing an interest when the RA was speaking, compared with males in the Gold-Standard Contact intervention and the Persuasion Control condition (see Figure 3). In conclusion, these results suggest males in the Two-Step Persuasion intervention generalize their positive and respect-related attitudes from the female whom they shared direct interactions with to another female who they saw regularly but with whom they did not have many direct interactions and to a new female they had not met before; whereas males in the Gold-Standard Contact intervention did not.

Although the results from this study are promising, they are not conclusive. This study was a partial field study; therefore, it was not conducted in an environment as strictly controlled as a lab room setting. For this reason, the study is vulnerable to a number of confounds. One issue is the variability of TA behaviour between conditions. TA behaviour during the building activities was not strictly scripted, so it is possible there was variation in TA behaviour across conditions that could influence the results. Another possible issue with a field study is that participants were in the same classes, so it is possible they interacted with each other outside of

the lab setting. As such, males from different intervention conditions are interacting and sharing their experiences from the intervention with each other, making it difficult to isolate whether the effects obtained from this study are from the intervention we attempted to implement or from interacting with peers from a different condition. Additional studies in a more controlled lab environment are necessary to address and eliminate each possible confound. One possible solution is to run the study so that an entire engineering classroom is assigned to a single condition. This suggestion will increase the likelihood that participants will exclusively interact with those from the same condition.

A critical concern about this study was a lack of power. Due to the complex nature of the study and the size of the eligible pool of female prospective participants, it was very difficult to obtain a large sample. It is critical to conduct additional studies that include a larger sample size to ensure a reasonable amount of power to correctly detect an effect.

One question not effectively answered by the current study design is whether the interventions successfully help women. The current design does not provide information about whether the changes produced in the social environment lead to important outcomes such as improved performance or greater retention within the program for female engineering students. Additional studies are required which measure whether changes to the male students' attitudes toward female engineers has a meaningful impact on female students.

Possible future directions for the current study is to implement the intervention at the high school or workplace level. In Canada, students start to select courses which will determine their career in high school. An intervention at the high school level can begin to close the gender gap in STEM when females start to opt out of physics and other courses that disqualify them from a STEM career. Implementing the intervention at the workplace level is another interesting future direction. The university setting is often composed of liberal students who are quite egalitarian. Therefore, a female engineering student may not face explicit prejudice or discrimination until she reaches the workplace. An intervention at the workplace level may be critical to help ensure females feel like they are in a stereotype-safe environment that allows them to achieve their full potential. Last, another possible future direction for this study is investigating whether an intervention aimed at improving the social environment by targeting majority group members could be a valuable intervention for other marginalized groups such as ethnic, religious, or sexual minorities. These minorities also deal with negative stereotypes about

their group in various domains and face prejudice and discrimination by other outgroups, thus they could benefit from this intervention.

Although past research has provided the targets of prejudice with tools to cope with the challenges of navigating a negative social environment, this does not address the source of the problem. A more comprehensive solution is to target majority group members by reducing their prejudiced attitudes, beliefs, and behaviour. By doing so, one can actually create a social environment where everyone feels and performs their best. The current study is the first step in developing this intervention, and provides a promising direction for future research.

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Appendix A
Pre-measures

Successful Transition to Engineering Program
Questionnaire

Before we begin the workshop, we would like to know a little bit about you. Please answer the following questions. Circle all the answers that apply.

1. Why did you decide to come to the University of Waterloo?

a) It has one of the best engineering programs in Canada
b) My friends are attending the university
c) It is close to home
d) Other (please specify): _____

2. Why do you want to be an engineer?

a) It is my passion, I truly enjoy this field of study
b) Engineers have high paying salaries
c) It is the area in school that I excel in
d) Other (please specify): _____

3. What do you want to do when you graduate from UW?

a) Work as an engineer in a big company
b) Start my own business
c) I'm not sure
d) Other (please specify): _____

4. Why did you decide to attend this "Transition to Engineering" program?

a) I think it will be helpful to my academic career
b) I think it will help me gain professional skills in engineering
c) Free food and money
d) Way to meet new people
e) Other (please specify): _____

List 5 Friends/Study Partners/Classmates

The following questions will ask you to list the initials of your closest friends, the people you study with, and your classmates. You may list the same people more than once if it applies.

1. Please list the initials of 5 of **your closest friends** at the University of Waterloo.

   Friend 1:

   Friend 2:

   Friend 3:

   Friend 4:

   Friend 5:

2. Please list the initials of the 5 **people you study with the most or the most often** (e.g., assignments, labs, sit with in class, etc.)

   Study partner 1:

   Study partner 2:

   Study partner 3:

   Study partner 4:

   Study partner 5:

3. Please list the initials of the 5 students in your class who you think **have the most potential to do well in engineering in the future**.

   Classmate 1:

   Classmate 2:

   Classmate 3:

   Classmate 4:

   Classmate 5:

Please answer the following questions about the people you listed as **5 of your closest friends** at the University of Waterloo.

Friend (initials)	**Gender (M/F)**	**Program/Major (e.g., electrical engineering)**	Use the scale below to answer the additional questions 0 1 2 3 4 5 6 7 8 9 10 Not at all Very much
1.			How **close or important** is this friendship? 0 1 2 3 4 5 6 7 8 9 10
			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
2.			How **close or important** is this friendship? 0 1 2 3 4 5 6 7 8 9 10
			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
3.			How **close or important** is this friendship? 0 1 2 3 4 5 6 7 8 9 10
			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
4			How **close or important** is this friendship? 0 1 2 3 4 5 6 7 8 9 10
			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
5.			How **close or important** is this friendship? 0 1 2 3 4 5 6 7 8 9 10
			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10

Please answer the following questions about the people you listed as the **5 people you study with the most or the most often** (e.g., assignments, labs, sit with in class, etc.)

Study Partner (initials)	**Gender (M/F)**	**Program/Major (e.g., electrical engineering)**	Use the scale below to answer the additional questions 0 1 2 3 4 5 6 7 8 9 10 Not at all Very much
1.			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
2.			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
3.			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
4			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
5.			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10

Please answer the following questions about the people you listed as the **5 students in your class who you think have the most potential to do well in engineering in the future**.

Classmate (initials)	**Gender (M/F)**	**Program/Major (e.g., electrical engineering)**	Use the scale below to answer the additional questions 0 1 2 3 4 5 6 7 8 9 10 Not at all Very much
1.			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
			How **likely are you to study** with this person? 0 1 2 3 4 5 6 7 8 9 10
2.			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
			How **likely are you to study** with this person? 0 1 2 3 4 5 6 7 8 9 10
3.			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
			How **likely are you to study** with this person? 0 1 2 3 4 5 6 7 8 9 10
4			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
			How **likely are you to study** with this person? 0 1 2 3 4 5 6 7 8 9 10
5.			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
			How **likely are you to study** with this person? 0 1 2 3 4 5 6 7 8 9 10

The Future of Engineering at UW

Indicate the extent to which you agree or disagree with each statement using the scales below.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

1. The Faculty of Engineering should implement and promote more Mentor-Protégé programs between first year engineering students and upper year students.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

2. Engineering courses should decrease the amount of independent work, and increase the amount of group work at UW.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

3. The Faculty of Engineering should allow engineers to take more non-engineering electives throughout their undergraduate career.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

4. The Faculty of Engineering should create more general engineering courses so engineering students can meet and work with other engineers with different majors.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

5. To increase the retention rate of first year engineering students, the Faculty of Engineering should create social support services to help students deal with the stress and anxiety caused by their heavy course load.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

6. It is important for the Faculty of Engineering to create programs directed at increasing the retention of women in engineering.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

7. The Faculty of Engineering should lower the grade cut-off point for academic probation and/or getting kicked out of the program for all first year engineering students.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

8. The Faculty of Engineering should work to promote an environment in which women can effectively pursue engineering.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

9. The Faculty of Engineering should make an effort to create a more supportive environment for engineering students by offering free on-campus tutors for all engineering courses.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

10. POETS should remain a student lounge space exclusive only to engineering students.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree					Neutral					Strongly Agree

Background Information

We are collecting this information to generally describe our study sample. All information provided will be kept confidential and will not be used to identify you. You may decline answering any of the questions.

1. Age: _____

2. Sex:
   Male ____
   Female ___

3. Ethnicity (please check all that apply)
   Aboriginal ___
   Black/African ___
   Chinese (including Hong Kong Chinese & Taiwanese)___
   East Indian ___
   Hispanic ___
   Japanese ___
   Korean ___
   Middle Eastern___
   West Indian ___
   White/Caucasian ___
   Other Asian groups ___
   Other, not listed ____ Please specify:_____

4. Faculty: _____

5. Major (e.g., electrical engineering): _____

6. Year of Study: _____

General Interests Survey

Note: Female participants in the Gold-Standard Contact condition listed 6 items for each interest category; all other participants in the Contact and Contact Control conditions listed 3 items.

1. Who are your 3 favourite **actors or actresses**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

2. What are your 3 favourite **movies**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

3. What are your 3 favourite types of **music**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

4. What or who are your 3 favourite **bands or musicians**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

5. What are your 3 favourite **books**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

6. What are your 3 favourite **blogs**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

7. Who are your 3 favourite **news sites**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

8. What are your 3 favourite **activities outside of school**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

9. What are your 3 favourite **TV shows**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

10. What are your 3 favourite **foods**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

11. What are your 3 favourite **video games**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

12. What are your 3 favourite **sports**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

13. What are your 3 favourite **comics** (including web-based)?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

14. Who are your 3 favourite **professors**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

15. Of all the places you have travelled on vacation, which were your 3 favourite **places**?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

16. If you could **travel** anywhere in the world, which 3 places would you go?

	Please indicate how **meaningful** each of these preferences is to you by using the scale below 0 Not at all meaningful 1 2 3 4 5 6 7 8 9 10 Very meaningful
1.	0 1 2 3 4 5 6 7 8 9 10
2.	0 1 2 3 4 5 6 7 8 9 10
3.	0 1 2 3 4 5 6 7 8 9 10

Appendix B
Manipulations

Two-Step Persuasion Condition & (Persuasion Control)

Successful Transition to Engineering Program

To help with your successful transition to engineering, we want to get you thinking about important issues and how these issues relate to being a good engineer.

The first thing we'd like you to consider are values.

WHAT ARE YOUR PERSONAL VALUES?

Below is a list of characteristics and values, some of them may be important to you; some may be unimportant to you. **Please rank them from 1 to 7** according to how important they are to you ("1" being the most important item, "7" being the one that is least important to you). Use each number only once.

_____ Being Artistic

_____ Creativity

_____ Membership in a Social Group (such as your community, racial group, or school club)

_____ Music

_____ Politics

_____ Relationships with Friends or Family

_____ Religious Values

Directions:

1.Look at the value you picked as most important to **you** (the value you ranked **#1** on the first page).
*(1.Look at the value you ranked as **#6** on the last page.)*
2.Think about times when this value was or would be very important to you.
(*2.Think about times when this value would be important to **someone else** (like another student at your school or a person you've heard about.))*
3.Describe why this value is important to you.
(3.Describe why this value would be important to someone else.)

Focus on your thoughts and feelings, and don't worry about spelling, grammar, or how well written it is.

Again, look at the value you picked as **MOST** important. List the top two reasons why this value is important to you.

*(Again, look at your **#6** value. List the top two reasons why **someone else** would pick this as their most important value.)*

1.

2.

Circle how much you agree or disagree with each of these statements.

1. **This value has influenced my life.**
(1. This value has influenced some people.)

Strongly --------Disagree--------Somewhat --------Somewhat-------- Agree--------Strongly
Disagree Disagree Agree Agree

2. This value is an important part of who I am.
(2. This value is important to some people.)

Strongly --------Disagree--------Somewhat --------Somewhat-------- Agree--------Strongly
Disagree Disagree Agree Agree

Diversity

The second issue we'd like to get you thinking about is diversity. How can people from different backgrounds (e.g., ethnicity, social class, gender) contribute to engineering success?

First, we'd like you to think back over your past experiences—perhaps in high school or so far at university. Can you think of a time when someone different from you was more capable than you originally thought? Describe that situation in the space below:

Latent Ability Video Script

In my recent research, one of the things we've been studying is what we call "Latent Ability". What "Latent Ability" is about, is that people often have more ability than their tests scores, whether they be math tests, whether they be IQ tests, whether they even be performance in school, than those tests show – they have more ability. Now, you might ask, what would that be about? How could they have more ability?

Well maybe this example will help: you could imagine 2 runners who are running heats in a 100-metre dash. One of those runners, in the first heat, maybe because he's a bit cocky, decides to wear ankle weights, and he runs the 100-metre in 10 seconds. Another runner, in a later heat, has exactly the same time, 10 seconds. They are the two fastest runners in the heats, they are facing off in the finals, and who do you think is going to win? Well, it's pretty easy to say now that the cocky runner took off the ankle weights, that the cocky runner is probably going to win that race. The ankle weights slowed him down and the 10 seconds underrepresented his ability to run the 100 metres – he would run faster in the finals, and actually have more ability than the 10 seconds in the heats indicated.

Well we argue that a similar thing can happen with intellectual testing, and it's not from people being cocky and wearing something like ankle weights, it's from something that's beyond their control, from stereotypes. We argue that stereotypes often undermine people's performance on tests in a way that prevents their true ability from actually showing. What we've been able to show in our research is that if we remove the implications of the stereotypes, if we create an environment in which people feel they won't be stereotyped, in which they feel they belong and they're accepted, they do much better than their previous performance had indicated. Just like the runner who was wearing ankle weights runs faster than the 10 seconds in the 100 metres, these students who are handicapped by stereotypes or who are brought down by stereotypes are able to do much better when those stereotypes are removed from the environment.

[Then the video shows the research paper, *Latent Ability: Grades and test scores systematically underestimate the intellectual ability of negatively stereotyped students* (Walton & Spencer, 2009), with a narrator reading the following statement: "Professor Steven Spencer conducted research on latent ability at the University of Waterloo and at Stanford University. His research has been published in Psychological Science, a top tier scientific research journal. "]

Two-Step Persuasion Condition Session 2 Refresher

Successful Transition to Engineering Program

We want to know more about how engineering students build important values into their lives.

WHAT ARE YOUR PERSONAL VALUES?

This is the same list of values you saw at Session 1. **Please rank them from 1 to 7** according to how important they are to you ("1" being the most important item, "7" being the one that is least important to you). Use each number only once.

It's okay if your list is different than last time. It's also okay if it is the same.

_____ Being Artistic

_____ Creativity

_____ Membership in a Social Group (such as your community, racial group, or school club)

_____ Music

_____ Politics

_____ Relationships with Friends or Family

_____ Religious Values

Directions:

1. Look at the value you picked as most important to **you** (the value you ranked **#1** on the first page).
2. Describe how you have displayed this value *since you started university*. Have you spent some time doing activities that are related to this value? Have you thought about the value once in a while?

Focus on your thoughts and feelings, and don't worry about spelling, grammar, or how well written it is.

What Do You Recall About the Video?

We are interested in how much students can recall about a video they saw three weeks earlier.

- Professor Steve Spencer talked about his research about engineering students, published in a top-tier journal.
- It showed that people who are part of a group that is stereotyped as being bad at engineering feel extra pressure to do well. They have extra stress, even if they, themselves, know the stereotype is not true.
- This extra stress can cause them to perform below their actual abilities in engineering. That is, they do worse than we would expect from looking at their past grades.
- So, if they are in a place where they know people are NOT stereotyping them, they no longer have extra stress, and their performance in engineering ends up even better than we would expect from looking at their past grades.

WHAT ANALOGY DID PROFESSOR SPENCER USE AS AN EXAMPLE?

Two-Step Persuasion Condition Session 3 Refresher

Most students see themselves as engineers, but also as other identities.

For example, perhaps you see yourself as:

A brother or sister?
A musician?
A blogger?
An animal lover?
A soccer player?
Or any other identity that it is important to you?

Identities can come from our relationships, from activities we do, from jobs we have had, or from our interests

1. What is one important identity that you have?

_____

_____

2. What is the most recent thing you did as part of that identity?

(Example: If "environmentalist" is your important identity, maybe you took the time to recycle after lunch even though you were in a hurry)

_____

_____

_____

_____

_____

_____

Two-Step Persuasion Condition Session 3 Female TA Anecdotes

2013 Female TA 1:

"When I was doing my masters, I needed to do some machining. So, I went to machine shop and asked if somebody could teach me how I could run the machines. The guy running the machine shop did not even try to teach me how to do the job, as he thought I am a girl and I won't be able to do machining. He got my samples and finished the job."

2013 Female TA 2:

"During undergrad, there was this guy within my circle of friends that was incredibly smart – within the top 5 of the class. Throughout the term, my friends and I got to know each other better and we started to tackle assignments and projects together, helping each other out whenever needed. Shortly, we realized that this individual would very subtly discriminate against me and my other female friends. He would never take any of our ideas into consideration for course projects, and any of our proposed solutions were always seen as incorrect. None of the girls were ever considered smart enough for him to treat with respect. When I was caught in this situation, I felt exactly as Dr. Spencer described in the video from Session 1, where I felt extra stress from having to prove my ability in front of this individual, and this had a negative impact on my marks that term. The following term, I avoid encountering him in an academic setting. Because the stress from his negative stereotypes was removed, my marks went back up. Without knowing it then, I had personally experienced everything Dr. Spencer mentioned from the psychology study."

2014 Female TA 1 (Same TA as 2013):

"When I was doing my masters, I needed to do some machining. So, I went to machine shop and asked if somebody could teach me how I could run the machines. The guy running the machine shop did not even try to teach me how to do the job, as he thought I am a girl and I won't be able to do machining. He got my samples and finished the job."

2014 Female TA 2:

"It wasn't even the first time I faced such an experience – when I was considering which engineering pathway to choose, many people advised me not to choose Computer Engineering because that would mean working in an office setting in a desk in front of the computer. I also had people advising me not to consider Mechanical Engineering because in their head it is "not a suitable job for women', because it would require working in sites and may include lifting/working with heavy machinery."

Respect Modelling

Two-Step Persuasion Condition:

Session 1 Presentation: The male TA asks the female TA for help on a research project he is working on: "*Do you think you'd have some time to help me with it? I think I could really benefit from your help since you have so much knowledge on the topic.*"

Session 2 Presentation: At the beginning of the presentation, the male TA re-introduces himself and the female TA, and says, "*She is awesome, she is helping me with my project and I appreciate her expertise.*"

Session 3 Presentation: During the presentation, the male TA tells the participants they will "*learn from an accomplished public speaker*" about tips on ways to improve their public speaking skills, while gesturing to the female TA, who then takes over and gives a tutorial on public speaking skills. Later in the presentation, the male TA reads testimonials from students about the struggles of being an engineering student. The female TA shares her own experiences and the experiences of the other female TA regarding feelings of not belonging in the field and discrimination faced by females. The male TA responds by saying, "*Thank you. That was interesting. I didn't know you went through experiences like that as you've been so successful in your field.*"

Gold-Standard Contact Condition:

Session 1 Presentation: Identical to the Two-Step Persuasion condition – the male TA asks the female TA for help on a research project he is working on: "*Do you think you'd have some time to help me with it? I think I could really benefit from your help since you have so much knowledge on the topic.*"

Session 2 Presentation: Identical to the Two-Step Persuasion condition – at the beginning of the presentation, the male TA re-introduces himself and the female TA, and says, "*She is awesome, she is helping me with my project and I appreciate her expertise.*"

Session 3 Presentation: The male TA tells the participants they will "*learn from an accomplished public speaker*" about tips on ways to improve their public speaking skills, while gesturing to the female TA, who then takes over and gives a tutorial on public speaking skills.

Gold-Standard Contact & Contact Control

Sample Group Member Profile

Jane Doe

ECE

Favourite Type of Music
- Rock
- House

Favourite Sports
- Football
- Soccer

Favourite TV Shows
- The Vampire Diaries
- Orphan Black

Favourite Professor
- Prof. X
- Prof. Y

If I could Travel Anywhere in the World:
- Italy
- Egypt

Favourite Movies
- Avatar
- Avengers

Favourite Activities Outside School
- Muay Thai
- Rock Climbing

Favourite Vacation
- Paris
- Niagara Falls

Favourite Foods
- Bubble Tea
- Stir Fry

Favourite Bands
- Linkin Park
- K-Drew

Gold-Standard Contact Condition

Jigsaw Classroom Manipulation

Structure Building Activity

1. Your objective: Build the tallest (or strongest) bridge possible.

2. The structure must be at least 2ft long.

3. You may only touch the materials that YOU are assigned by the TAs.
    a. Exception: You may touch others' materials to help stabilize the structure as you build.
    b. Example – the team member who brings the popsicle sticks is the only team member who can touch the popsicle sticks as they build. However, other members may touch popsicle sticks ONLY to help hold up the structure as it is being secured.

4. You have 10 minutes from GO.

5. You must use up ALL of your materials before asking the TAs for more.
    a. Exception: Tape. You do not have to use up all the tape before asking for more straws or popsicle sticks.

Skill-testing Question

1. The mass of a classical atom comes mostly from its ____ ; and its volume from its _____.
    a. nucleons; nucleons.
    b. electrons; electrons.
    c. electrons; nucleons.
    d. nucleons; electrons. (correct answer)

Appendix C
Dependent Measures

Take-away message

Using the space below, please answer the following question: What are the take-away messages from the STEP program?

Group Member Evaluation

Note: Participants in the Persuasion Control condition were not required to answer these questions (they did not participate in group work)

As part of the program evaluation, we would like you to evaluate the other participants in your group. Please open the envelope beside you and take out the sheets that have information concerning your group members. Please refer to these sheets when answering the questions below.

Please answer the following questions about the other members in your group using the scale below.

0	1	2	3	4	5	6	7	8	9	10
Not at all										Very Much

Group Member 1

1. How well do you remember this person?
2. How intelligent was this member of your group?
3. How nice was this member of your group?
4. How much did you like this member of your group?
5. How much did you respect this member of your group's contribution to the group?
6. If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together?
7. If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?

Group Member 2

1. How well do you remember this person?
2. How intelligent was this member of your group?
3. How nice was this member of your group?
4. How much did you like this member of your group?
5. How much did you respect this member of your group's contribution to the group?
6. If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together?
7. If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?

Group Member 3

1. How well do you remember this person?
2. How intelligent was this member of your group?

3. How nice was this member of your group?
4. How much did you like this member of your group?
5. How much did you respect this member of your group's contribution to the group?
6. If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together?
7. If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?

Group Member 4

1. How well do you remember this person?
2. How intelligent was this member of your group?
3. How nice was this member of your group?
4. How much did you like this member of your group?
5. How much did you respect this member of your group's contribution to the group?
6. If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together?
7. If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?

Group Member 5

1. How well do you remember this person?
2. How intelligent was this member of your group?
3. How nice was this member of your group?
4. How much did you like this member of your group?
5. How much did you respect this member of your group's contribution to the group?
6. If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together?
7. If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?

Group Member 6

1. How well do you remember this person?
2. How intelligent was this member of your group?
3. How nice was this member of your group?
4. How much did you like this member of your group?
5. How much did you respect this member of your group's contribution to the group?

6. If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together?
7. If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?

Group Member 7

1. How well do you remember this person?
2. How intelligent was this member of your group?
3. How nice was this member of your group?
4. How much did you like this member of your group?
5. How much did you respect this member of your group's contribution to the group?
6. If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together?
7. If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?

Group Member 8

1. How well do you remember this person?
2. How intelligent was this member of your group?
3. How nice was this member of your group?
4. How much did you like this member of your group?
5. How much did you respect this member of your group's contribution to the group?
6. If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together?
7. If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?

Group Member 9

1. How well do you remember this person?
2. How intelligent was this member of your group?
3. How nice was this member of your group?
4. How much did you like this member of your group?
5. How much did you respect this member of your group's contribution to the group?
6. If you were in the same class as this member of your group, how likely would you be to pick him/her to work on a project together?
7. If you were having difficulty on a problem for class, how likely would you be to ask this member of your group for help?

Male Group Member Evaluation

Note: Only female participants in the Two-Step Persuasion, Gold-Standard Contact, and Contact Control conditions answered the following questions

The following questions are about the male members of your group. Please open the envelope beside you and take out the sheets that have information concerning your group members. Please refer to these sheets when answering the questions below.

Please indicate your agreement with the following statements using the scale below.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

1. The male members of my group were friendly towards me.
2. The male members of my group liked me.
3. The male members of my group respected me.
4. The male members of my group paid attention to what I had to say.

Please answer the following questions about the male members of your group using the scale below.

0	1	2	3	4	5	6	7	8	9	10
Not at all										Very much

Group Member 1

1. How often did this member of your group interrupt you?
2. How much did you like this member of your group?
3. How much did you feel this member of your group was looking at your body?
4. How much did you respect this member of your group?

Do you think this member of your group flirted with you?

0	1	2	3
Definitely not	Maybe	Probably	Definitely

Group Member 2

1. How often did this member of your group interrupt you?
2. How much did you like this member of your group?
3. How much did you feel this member of your group was looking at your body?
4. How much did you respect this member of your group?

Do you think this member of your group flirted with you?

0	1	2	3
Definitely not	Maybe	Probably	Definitely

Group Member 3

1. How often did this member of your group interrupt you?
2. How much did you like this member of your group?
3. How much did you feel this member of your group was looking at your body?
4. How much did you respect this member of your group?

Do you think this member of your group flirted with you?

0	1	2	3
Definitely not	Maybe	Probably	Definitely

Group Member 4

1. How often did this member of your group interrupt you?
2. How much did you like this member of your group?
3. How much did you feel this member of your group was looking at your body?
4. How much did you respect this member of your group?

Do you think this member of your group flirted with you?

0	1	2	3
Definitely not	Maybe	Probably	Definitely

Group Member 5

1. How often did this member of your group interrupt you?
2. How much did you like this member of your group?
3. How much did you feel this member of your group was looking at your body?
4. How much did you respect this member of your group?

Do you think this member of your group flirted with you?

0	1	2	3
Definitely not	Maybe	Probably	Definitely

Group Member 6

1. How often did this member of your group interrupt you?
2. How much did you like this member of your group?
3. How much did you feel this member of your group was looking at your body?
4. How much did you respect this member of your group?

Do you think this member of your group flirted with you?

0	1	2	3
Definitely not	Maybe	Probably	Definitely

Group Member 7

1. How often did this member of your group interrupt you?
2. How much did you like this member of your group?
3. How much did you feel this member of your group was looking at your body?
4. How much did you respect this member of your group?

Do you think this member of your group flirted with you?

0	1	2	3
Definitely not	Maybe	Probably	Definitely

Group Member 8

1. How often did this member of your group interrupt you?
2. How much did you like this member of your group?
3. How much did you feel this member of your group was looking at your body?
4. How much did you respect this member of your group?

Do you think this member of your group flirted with you?

0	1	2	3
Definitely not	Maybe	Probably	Definitely

Group Member 9

1. How often did this member of your group interrupt you?
2. How much did you like this member of your group?
3. How much did you feel this member of your group was looking at your body?
4. How much did you respect this member of your group?

Do you think this member of your group flirted with you?

0	1	2	3
Definitely not	Maybe	Probably	Definitely

Do you have any additional comments about working with the male members of your group? If so, please write them below:

TA Evaluation

As part of our program evaluation, we would like to know what you think about the TAs that were hired to help run this program.

Please open your envelope and take out the sheet that has information concerning your TAs. Please refer to this sheet when answering the questions below.

Please answer the following questions using the scale below.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

TA 1

1. The TA was competent at his/her job.
2. The TA was a warm person.
3. I liked the TA.
4. I respected the TA.

TA 2

1. The TA was competent at his/her job.
2. The TA was a warm person.
3. I liked the TA.
4. I respected the TA.

In 4th year, engineering students must complete a final project. As part of the project, students are allowed the opportunity to have a mentor guide them through the task. Please answer the following questions concerning your feelings toward the TAs acting as your future mentor.

I would like to have TA 1 as a course mentor for my 4th year project.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

I would like to have TA 2 as a course mentor for my 4th year project.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

Which TA would you rather have as a course mentor for your 4th year project?

- ❍ TA 1
- ❍ TA 2

List 5 Friends/Study Partners/Classmates

The following questions will ask you to list the initials of your closest friends, the people you study with, and your classmates. You may list the same people more than once if it applies.

1. Please list the initials of 5 of **your closest friends** at the University of Waterloo.

   Friend 1:

   Friend 2:

   Friend 3:

   Friend 4:

   Friend 5:

2. Please list the initials of the 5 **people you study with the most or the most often** (e.g., assignments, labs, sit with in class, etc.)

   Study partner 1:

   Study partner 2:

   Study partner 3:

   Study partner 4:

   Study partner 5:

3. Please list the initials of the 5 students in your class who you think **have the most potential to do well in engineering in the future**.

   Classmate 1:

   Classmate 2:

   Classmate 3:

   Classmate 4:

   Classmate 5:

Please answer the following questions about the people you listed as **5 of your closest friends** at the University of Waterloo.

Friend (initials)	**Gender (M/F)**	**Program/Major (e.g., electrical engineering)**	Use the scale below to answer the additional questions 0 1 2 3 4 5 6 7 8 9 10 Not at all Very much
1.			How **close or important** is this friendship? 0 1 2 3 4 5 6 7 8 9 10
			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
2.			How **close or important** is this friendship? 0 1 2 3 4 5 6 7 8 9 10
			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
3.			How **close or important** is this friendship? 0 1 2 3 4 5 6 7 8 9 10
			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
4			How **close or important** is this friendship? 0 1 2 3 4 5 6 7 8 9 10
			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
5.			How **close or important** is this friendship? 0 1 2 3 4 5 6 7 8 9 10
			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10

Please answer the following questions about the people you listed as the **5 people you study with the most or the most often** (e.g., assignments, labs, sit with in class, etc.)

Study Partner (initials)	**Gender (M/F)**	**Program/Major (e.g., electrical engineering)**	Use the scale below to answer the additional questions 0 1 2 3 4 5 6 7 8 9 10 Not at all Very much
1.			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
2.			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
3.			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
4			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
5.			How **good of a study partner** is this person? 0 1 2 3 4 5 6 7 8 9 10
			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10

Please answer the following questions about the people you listed as the **5 students in your class who you think have the most potential to do well in engineering in the future**.

Classmate (initials)	**Gender (M/F)**	**Program/Major (e.g., electrical engineering)**	Use the scale below to answer the additional questions 0 1 2 3 4 5 6 7 8 9 10 Not at all Very much
1.			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
			How **likely are you to study** with this person? 0 1 2 3 4 5 6 7 8 9 10
2.			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
			How **likely are you to study** with this person? 0 1 2 3 4 5 6 7 8 9 10
3.			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
			How **likely are you to study** with this person? 0 1 2 3 4 5 6 7 8 9 10
4			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
			How **likely are you to study** with this person? 0 1 2 3 4 5 6 7 8 9 10
5.			How much do you **respect** this person's knowledge of engineering? 0 1 2 3 4 5 6 7 8 9 10
			How **likely are you to study** with this person? 0 1 2 3 4 5 6 7 8 9 10

Implicit Association Test (IAT)

LINK: https://artsweb.uwaterloo.ca/~sslab/STEPstudy/study.php

1st Block Instructions:

The following task concerns aspects of respect.

You will be presented with a series of traits or qualities that people can possess.

When completing this task try to think about people who have these qualities or traits, and whether or not you respect them.

Specifically, try to think to yourself, "I respect people who have this trait" or "I don't respect people who have this trait".

Press the 'a' key if the stimulus corresponds with the category of traits I DON'T RESPECT.
Press the 'k' key if the stimulus corresponds with the category of traits I RESPECT.

Please place your hands on the keyboard now, so that you can press the 'a' key with your left hand, and the 'k' key with your right hand.

Make sure that your hands are positioned correctly because only 'a' and 'k' will be recognized by the program.

GO FAST but please select the answer you want.

2nd Block Instructions

The next two categories that you are to distinguish are:

OBJECTS vs. FEMALE ENGINEERS.

Press the 'a' key if the stimulus is an OBJECT.
Press the 'k' key if the stimulus is a FEMALE ENGINEER.

Please place your hands on the keyboard now, so that you can press the 'a' key with your left hand, and the 'k' key with your right hand.

GO FAST but please select the answer you want.

3rd Block Instructions:

The four categories that you are to distinguish are:

I DON'T RESPECT vs. I RESPECT trait.
or
OBJECTS vs. FEMALE ENGINEERS.

Press the 'a' key if the stimulus is a trait I DON'T RESPECT or an OBJECT.
Press the 'k' key if the stimulus is a trait I RESPECT or a FEMALE ENGINEER.

Please place your hands on the keyboard now, so that you can press the 'a' key with your left hand, and the 'k' key with your right hand.

GO FAST but please select the answer you want.

4th Block Instructions:

The next two categories that you are to distinguish are:

FEMALE ENGINEERS vs. OBJECTS.

Press the 'a' key if the stimulus is a FEMALE ENGINEER.
Press the 'k' key if the stimulus is an OBJECT.

Please place your hands on the keyboard now, so that you can press the 'a' key with your left hand, and the 'k' key with your right hand.

GO FAST but please select the answer you want.

5th Block Instructions

The four categories that you are to distinguish are:

I DON'T RESPECT vs. I RESPECT trait.
or
FEMALE ENGINEERS vs. OBJECTS.

Press the 'a' key if the stimulus is a trait I DON'T RESPECT or a FEMALE ENGINEER.
Press the 'k' key if the stimulus is a trait I RESPECT or an OBJECT.

Please place your hands on the keyboard now, so that you can press the 'a' key with your left hand, and the 'k' key with your right hand.

GO FAST but please select the answer you want.

Stimuli

Respect words

Positive words: Honest, Responsible, Competent

Negative words: Lazy, Foolish, Ignorant

Images

Objects




Female Engineers




Sexist Joke

Please read the following joke and answer the questions below:

A math student and an engineering student are in a psychology study. They sit on one side of a room and wait. A door opens on the other side of the room, and a naked woman enters. The experimenter instructs them, "Every two minutes, a bell will ring, and you may move half the remaining distance towards the woman." The bell rings, and the engineering student moves halfway across the room. The math student walks out, saying "I have done the calculations. We will get closer and closer, but we will never get to the woman." The engineering student shrugs, saying, "I have done the calculations too, and in three minutes I will be close enough for all practical purposes."

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

1. This is clearly a joke, the person who wrote it was just trying to be funny.
2. This joke crosses a line, it should not be taken lightly.
3. The author of this joke should not have written the joke.
4. This joke might make people in my class feel bad.
5. People who are upset by this joke are too uptight.

Modified Ambivalent Sexism Scale

Below is a series of statements concerning men and women in engineering and their relationship in society.

Please indicate the degree to which you agree or disagree with each statement using the following scale.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

1. Many female engineering classmates are actually seeking special favors, such as scholarships or co-op jobs that favour them over male classmates, under the guise of asking for "equality."
2. Female engineering classmates are too easily offended.
3. Female engineering classmates should be protected by male classmates.
4. Most female engineering classmates fail to fully appreciate all that male classmates do for them.
5. Female engineering classmates seek to gain power by getting control over men.
6. Female engineering classmates exaggerate problems they have at school.
7. When female engineering classmates lose to male classmates in a fair competition, they typically complain about being discriminated against.
8. Some female engineering classmates get a kick out of teasing men by seeming interested in sex and then rejecting them when they make a move.
9. Female engineering classmates, compared to male classmates, tend to be more pure and moral than men.
10. Female engineering classmates, as compared to male classmates, tend to have a more refined sense of culture and good taste.
11. I enjoy having female engineering classmates in my engineering classes because they make the classroom nicer to look at.
12. I would like there to be more female engineering classmates in my program because that would open up more dating possibilities.
13. In order to do well in engineering, female engineering classmates need extra academic support compared to men.
14. Male engineers should go out of their way to help their female engineering classmates with course work.

Behaviour Coding

1) How open was his posture?

Open = knees apart, shoulders back, leaning towards you or leaning back openly.

Closed = knees together or legs crossed, shoulders more hunched, leaning in on himself, arms over his body.

1 ----------2 ----------3 ----------4

Very Closed Somewhat Closed Somewhat Open Very Open

2) How often did he look at your body?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

3) How often did he interrupt you?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Very Often

4) Which chair did he sit in?

The Closer Chair OR The Further Chair

5) How much physical contact was there?

1	2	3	4
None	Very Little	Some	A lot

6) How confident did he seem?

0	1	2	3	4	5
Not at all Confident					Very Confident

7) How dominant did he seem?

0	1	2	3	4	5
Not at all Dominating					Very Dominating

8) Did he flirt with you?

0	1	2	3	4	5
Not at all Flirtatious					Very Flirtatious

9) How sexist was he?

0	1	2	3	4	5
Not at all Sexist					Very Sexist

10) How warm was he?

0	1	2	3	4	5
Not at all Warm					Very Warm

11) How much did you like him?

0	1	2	3	4	5
Not at all					Very Much

12) How respectful was he?

0	1	2	3	4	5
Not at all Respectful					Very Respectful

13) Was he paying attention?

0	1	2	3	4	5
Not at all Paying Attention					Very Much Paying Attention

14) Was he taking you seriously?

0	1	2	3	4	5
Not at all Seriously					Very Seriously

15) How much eye contact did he make with you?

0	1	2	3	4	5
No eye contact at all					Lots of Eye Contact

16) Did he check his phone?

Yes OR No

17) Did he patronize you?

0	1	2	3	4	5
Not at all Patronizing					Very Patronizing

18) Anything else you noticed?

_____

_____

_____

_____